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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,863	09/11/2003	Chih C. Shih	200209582-2	8677

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EXAMINER	
PRUCHNIC, STANLEY J	

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 11/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/660,863	SHIH ET AL.	
	Examiner	Art Unit	
	Stanley J. Pruchnic, Jr.	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 15 October 2004 have been fully considered but they are not persuasive. The arguments have been addressed in the rejections below, as applied to Claims 1 and 3-9.

2. Applicant's arguments with respect to claims 10-23 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 8 is objected to because of the following informalities:

In Claim 8, in Line 5, the word "such" before "interface temperatures" should be deleted and replaced therefor by --said-- in order to clearly describe the invention.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1 and 3 are rejected under 35 U.S.C. 102(e) as being anticipated by OSONE *et al.* (U. S. Patent Application Publication No. US 2003/0072349 A1, hereinafter ***OSONE***).

OSONE discloses a test method, comprising:

squeezing a thermal interface material (TIM) sample 1 (, e.g., a resin 1) at a plurality of different pressures (magnitude of load) at different times [Paragraphs 0031-0032];

flowing heat [para. 0059] through said TIM sample to create a thermal gradient (see Figs. 1, 6 and 7) between a heat source and a cold sink at each of said plurality of different pressures;

measuring temperatures [para. 0064] at a plurality of points along said thermal gradient at respective ones of said plurality of different pressures;

adjusting the pressure applied at each of said plurality of different pressures to maintain a constant pressure [paras. 0099-0100] on the TIM sample even though said sample expands and contracts with changes in its temperature; and

characterizing the thermal material properties [para. 0087] of said TIM sample from calculations based on data obtained in the step of measuring as claimed by Applicant in Claim 1.

OSONE discloses the relationship between pressure and applied load, and discloses that a magnitude of the applied load is kept constant, or the magnitude of the load is kept at a set value according to a time-based profile of load [para. 0105], therefore clearly disclosing the method includes adjusting the pressure applied, since the height of the stage 11 is controlled based on the results of the load-measuring device 10.

In response to Applicant's argument that ***OSONE*** discloses the method described in Paragraph 99, *etc.*, is ineffective when there are changes in size [length or

thickness] of the resin: ***OSONE*** further discloses in Paragraph 100, in the concluding sentence, that the method is effective even for the resin that does not correspond to "the above described conditions", *i.e.,* when changes in length or thickness are small. Thus, OSONE teaches the method is also effective when there are length or thickness changes of the resin during the measurement period.

OSONE further inherently discloses delaying the step of characterizing until temperature measurements in the step of measuring have reached a steady-state [para. 0008, constant amount of heat flow, stationary method] as claimed by Applicant in Claim 3. Although ***OSONE*** does not explicitly teach "a delay", it is very well known in the art that a delay time is required in order to wait for "steady-state" or "stationary" thermal conditions to be set up, since there must be an initial time before any temperature difference exists, followed by a heating and/or cooling time (Note, Fig. 7 includes both a "high temperature side" and a "low temperature side") before reaching steady-state conditions, the time during which a steady heat flow is being set up is inherently the required "delay time".

6. Claims 1, 3 and 8-9 are rejected under 35 U.S.C. 102(b) as being anticipated by ***AUDET*** *et al.* (U. S. Patent No. 3,817,109, hereinafter ***AUDET***).

AUDET discloses a test method, comprising

squeezing a thermal interface material (TIM) sample 84, 85 at a plurality of different pressures at different times; flowing heat through said TIM sample to create a thermal gradient between a heat source (70) and a cold sink (86, 87) at each of said plurality of different pressures;

measuring temperatures at a plurality of points along said thermal gradient at respective ones of said plurality of different pressures (Col. 6, Lines 7-63); Col. 7, Lines 34-48);

maintaining a constant pressure (Col. 2, Lines 45-48; Col. 7, Lines 34-50) at each of said plurality of different pressures in spite of any thermal expansions of said TIM sample during a test; and

characterizing the thermal material properties of said TIM sample from calculations based on data obtained in the step of measuring as claimed by Applicant in Claim 1.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., that the material (sample) disclosed by ***AUDET*** is not "similar to" the "thermal interface material (TIM)" disclosed in the present invention, because they include materials having insulative properties) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The claims do not limit the material being characterized to being either thermally conductive or thermally insulative, but only require the materials to be "thermal interface materials". Thus, ***AUDET*** is considered to disclose "thermal interface materials", as claimed by Applicant, since the materials are disclosed by ***AUDET*** to be used as a "thermal interface", considered to include the insulative materials used in

deep sea swimmer suits (Col. 1, Lines 1-7ff). The important feature is not considered to be the particular material, but the method used to test or characterize the material.

In response to applicant's argument that the gas pressure disclosed by ***AUDET*** is not the same or equivalent to the pressure claimed by Applicant in Claim 1: The pressure in the chamber is maintained constant by means which are independent of (not affected by) the material sample. The sample dimensions of the material disclosed by AUDET do not affect the pressure, as claimed by Applicant. Moreover, it is clear from the data presented by AUDET that more than one pressure was selected, thus a plurality of different pressures was used in the test method disclosed by AUDET.

AUDET further discloses delaying the step of characterizing until temperature measurements in the step of measuring have reached a steady-state (delaying until "***When*** the system reaches thermal equilibrium"; Col. 7, Line 6) as claimed by Applicant in Claim 3. It is well known that "steady state conditions" is equivalent terminology for "equilibrium conditions" as described above.

AUDET further discloses computing a thermal resistance curve across intervening hot and cold blocks along said thermal gradient to extrapolate interface temperatures on opposite sides of said TIM sample; and using such interface temperatures in a calculation of the thermal resistance of said TIM sample at each of said plurality of different pressures; determining a relationship between temperature and distance along each of the hot and cold blocks at steady-state with simple linear regression as claimed by Applicant in Claims 8-9.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over ***AUDET*** in view of **EI-HUSAYNI** (U. S. Patent No. 5,940,784).

AUDET, to summarize, discloses all the limitations as claimed by Applicant in Claims 4-7, as described above in Paragraph 6 as applied to Claims 1, 3 and 8-9, further including the limitations of delaying the step of characterizing until temperature measurements in the step of measuring should have reached a steady-state (Col. 3, Lines 35-54); determining a particular set of pressures to use in the step of squeezing (See Fig. 4); AUDET would, in normal operation, observe a time delay needed for steady-state thermal conditions when he observes the steady-state conditions; and AUDET would, in normal operation, determine heating and cooling requirements needed to establish said thermal gradient in order to operate the testing apparatus.

AUDET as described above, does not explicitly disclose the use of trial runs of the sample as claimed by Applicant in Claims 4-7.

EL-HUSAYNI discloses a test method in the same field as AUDET, for measuring thermal properties of a specimen. EL-HUSAYNI discloses an automated method wherein the measurements are repeatedly done until values are within a range indicating thermal equilibrium has been established. Moreover, it is well known in the art that it is equivalent to substitute a sample having the same thermal properties as a test sample in order to perform trial runs before using the actual sample, in order to avoid changing the sample in any way by the measurement process, in order to optimize the process before using the actual sample to be tested, or to use the same sample, so that the sample will not require changing prior to doing the actual run, once all trial runs are completed.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include trial runs of the sample to determine optimum conditions are met as already suggested by AUDET, and to determine when thermal equilibrium has been established as taught by EL-HUSAYNI.

10. Claims 10-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over ***OSONE*** in view of ***STANLEY*** *et al.* (U. S. Patent No. 3,733,887, hereinafter ***STANLEY***).

OSONE discloses a materials testing system, comprising:

a fixture (Fig. 7) for placing a thermal interface material (TIM) between a hot 4 and a cold 5 block;

a press 11 for squeezing the TIM between the hot and cold blocks at a plurality of pressures and for a plurality of durations according to a test profile;

a heater 7 and cooler 8 connected to the hot and cold blocks for creating a thermal gradient across the TIM;

a compensating controller (HEIGHT/LOAD CONTROL; Fig. 7) adjusting the pressure applied to the TIM to be constant even though said TIM sample expands and contracts with changes in its temperature [Paragraphs 0031-0032; 0099-0105];

a set of sensors [*e.g.,* Paras. 0064, 0072] for collecting temperature information (T1, T2; T5, T6) from the hot 4 and cold 5 blocks during the steps of squeezing and creating; and

a computer ("COMPUTING/CONTROL DEVICE (PC)") for building a thermal-resistance-curve model of said TIM sample from data obtained in the step of collecting temperature information as claimed by Applicant in Claim 10.

OSONE further discloses a gauge for measuring the thickness of said TIM sample, strategic placement of thermocouples, and a computer, which is capable of calculating a least-squares fit as claimed by Applicant in Claims 11-13.

OSONE as described above, does not teach the hot and cold blocks are made of copper as claimed by Applicant.

Regarding the method steps: The steps as claimed by Applicant in Claims 15-23 are met in the normal operation of the device of OSONE, as described above, and further including placing the material in the fixture, squeezing (applied load; OSONE disclosed this is done at a constant pressure(s) according to a test profile in order to provide measured thermal data for the sample at each of the pressures; adjusting the pressure(s) to be constant, as stated above, and building a thermal resistance curve

model. Moreover, regarding Claim 16, OSONE describes the plates as parallel, this not being operator dependent, and the system uses a computer for "offline" measurement, understood to be calculations as claimed by Applicant in Claim 17. Regarding the particular load range, from a few pounds to in excess of 400 pounds, although not explicitly disclosed, absent criticality, the method of OSONE would inherently include using pressures within the claimed range. OSONE suggests measuring sample load and deflection and correlating these measurements as claimed by Applicant in Claims 22 and 23.

OSONE, to summarize, is shown to teach or suggest all of the limitations as claimed by Applicant, with the exception of the hot and cold blocks being made of copper.

STANLEY discloses that is known in the art to provide a thermal property measurement device with copper blocks because copper is a good thermal conductor.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use copper for the hot and cold blocks of OSONE in order to benefit from the high thermal conductivity as taught by STANLEY.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stanley J. Pruchnic, Jr., whose telephone number is **(571) 272-2248**. The examiner can normally be reached on weekdays (Monday through Friday) from7:30 AM to 4:00 PM7:30 AM to 4:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego F. F. Gutierrez can be reached at **(571) 272-2245**.

The ***Official FAX*** number for Technology Center 2800 is **(703) 872-9306** for ***all official communications***.

Any inquiry of a general nature or relating to the status of this application or proceeding may be directed to the official USPTO website at **http://www.uspto.gov/** or

you may call the **USPTO Call Center** at **800-786-9199** or 703-308-4357. The Technology Center 2800 Customer Service FAX phone number is (703) 872-9317.

The cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources.

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DIEGO F. F. GUTIERREZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Stanley J. Pruchnic, Jr.
17 November 2004